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EDITORIAL

WITH this first issue of the UNIVERSITY OF TORONTO MEDICAL JOURNAL we mark an epoch in the history of the undergraduate body of the Faculty of Medicine. We are attempting to do something hitherto untried, as far as we can ascertain, in any medical undergraduate body on this continent, although we have examples of undertakings of a similar nature in some universities in Great Britain. We feel that the JOURNAL will have a definite place and mission in this faculty and with the help of staff and students, we will make it a useful acquisition to the medical student's literary equipment.

The mission of the JOURNAL is two-fold. Firstly—it has been felt that the writing and preparation of papers should be more encouraged among the students. It is one of our ultimate aims to have a journal or writing club—the name is immaterial—organized in each year on a voluntary basis. Particularly good papers would be handed on to the student body through the medium of the JOURNAL. A very successful voluntary writing society has been in operation at the University of Edinburgh for many, many years. Secondly—there are appearing constantly in the current literature, articles and accounts of recent researches which would be of inestimable value to the student. For the most part, the average medical student seldom sees an Association Journal of any kind. We, therefore, plan to reprint for him, from time to time, outstanding material that may appear. We may cite an example. In an early issue we hope to reproduce, with the courtesy of the *British Medical Journal*, an article by Sir Thomas Lewis entitled "Cardiological principles in General Practice". This is a classic and should be in the hands and head of every medical student. Yet, we will venture to say that not two dozen undergraduates have heard of it, let alone read it.

One can visualize the many important departments that may develop in a publication of this nature. New books may be reviewed; notes may be made from current literature; as time goes on a valuable Alumni connexion should be established, and so on. For the first while, we will be dependent on interested members of the staff for a considerable quantity of our material and incidentally we hope that each issue will contain a leading article of universal interest from one of the faculty members who may be doing advanced work along some particular line. Individually, the members of the staff of the Faculty of Medicine are enthusiastic in their support of the project, although as a whole they have no responsibility in the matter whatever.

We urge all, students and professors alike, to give us their wholehearted support in our effort for the still further advancement of this faculty in the medical world.

THE UNIVERSITY OF TORONTO

EVERY once in a while in the history of institutions there is what the old chroniclers would term "a most memorable event". And in the body of tradition which a university gradually builds up there are certain notable achievements which stand out above others. The recent award of the Nobel prize in medicine to Dr. Banting and Prof. Macleod constitutes such an event in the history of the University of Toronto. It is a most singular honour and represents the significance of the scientific work in the discovery of insulin with which the names of these two men are associated. The recent history of the discovery and use of insulin is familiar to everyone. Some facts, however, concerning the Nobel prize may be of interest in this connection.

Alfred Nobel, the founder of the Prize Fund, was a distinguished Swedish scientist and chemist. He studied in the United States and in Russia and later was employed by the Russian Government to prepare mines and torpedoes. In conjunction with his father he carried on intensive experimental work which was productive of a great number of inventions in metallurgy and chemistry. He discovered nitroglycerine, dynamite, explosive gelatine and ballistite.

At his death Nobel left an estate worth over nine millions and in his will directed that this sum should constitute a fund, the interest from which should be divided into five equal amounts and awarded to the person who shall have done the most noteworthy work in the following five fields—physics, physiology or medicine, chemistry, idealistic literature, the forwarding of international peace. The prize in each case approximates to $40,000 in value.

The prizes in physics and chemistry are awarded by the Royal Academy of Science in Stockholm; in medicine by the Caroline Medical Chirurgical Institute in Stockholm; in literature by the Swedish Academy in Stockholm; and in peace by the Norwegian Parliament.

Drs. Banting and Macleod are the second British subjects to receive the award in medicine. They have already announced that they will share the prize with Dr. Collip and Mr. C. H. Best who were also connected with the early experimental work on insulin. In this award great distinction has been conferred upon Professor Macleod and his colleagues and we wish to be associated in the congratulations which have been extended to them from all quarters.

AT the present time the problem of the functions of the various endocrine glands is occupying a prominent place in the researches of laboratory men and clinicians. The recent discovery of insulin has attracted world-wide attention because of its practical value in the treatment of diabetes. A further discovery is announced in a recent issue of the *Journal of the American Medical Association* in a preliminary report by Drs. Allen and Doisy on the isolation of an ovarian hormone. This has not attracted as great attention as the previous discovery since it cannot have such a widespread practical application. It has, however, many clinical possibilities.

This ovarian hormone has been extracted from the liquor folliculi of the Graafian follicle. It is believed to be an extracellular hormone produced by the follicle cells of the ovary under the influence of the maturing ova. The results of their animal experimentation may be briefly summarized as follows:

1. From one to three subcutaneous injections of the extract into animals from whom the ovaries had been removed, produced the typical oestrual hyperaemia, growth and hypersecretion in the genital tract, and growth in the mammary gland. After a time the effect of the injections wore off and typical degenerative changes set in.

2. While in the condition of artificially induced oestrus the animals experienced typical mating instincts and could be mated with normal vigorous males.

3. Injections made into animals immediately after weaning caused them to become sexually mature in two to four days, at least twenty to forty days before the usual time of the attainment of puberty.

4. The hormone is not species specific since it was obtained from the ovaries of hogs and cattle and produced results in the mouse and the rat.

It would seem that the appearance in the circulation of this hormone is responsible in part at least for the onset of puberty and its alternate presence and absence for the mechanism of oestrual phenomena.

These results of Allen and Doisy seem to settle the question as to which part of the ovary controls the menstrual function. They open up also possibilities of specific organotherapy. Tests on the therapeutic value of the hormone are being carried on and further developments will be watched with interest.

IT is not often that we have the privilege of reading a poet's comment on the art of medicine, and therefore Rudyard Kipling's address to the Royal College of Surgeons which we publish elsewhere in this issue has a unique interest. All of Kipling's work has been characterized by the intensity with which he has recorded the life of his day. His realism has embraced even the complex details of such diverse interests as ship-building and medicine. This recalls a certain earlier poem of his in which the clinical thermometer and the fever chart are mentioned—certainly novel figures in poetry! In "The Parting of the Columns", which deals with the farewells of the soldiers who fought side by side in the Boer war, occur the following stanzas:

> There isn't much we 'aven't shared since Kruger cut an' run,
> The same old work, the same old skoff, the same old dust and sun;
> The same old chance that laid us out or winked an' let us through;
> The same old life, the same old death. Goodbye—good luck to you!
>
> Our blood 'as truly mixed with yours—all down the Red Cross train,
> We've bit the same thermometer in Bloemingtyphoidtein,
> We've 'ad the same old temp'rature—the same relapses, too,
> The same old saw-backed fever chart. Goodbye—good luck to you!

Annual Medical At-Home

The Annual Medical At-Home will be held at the King Edward Hotel on Friday evening, February 1st. Tickets will be limited to 300 and the subscription will be five dollars a couple for undergraduates.

Contributions to this JOURNAL should be sent to the Medical Society Office, Room 107, Anatomy Building, University of Toronto.

THE UNIVERSITY OF TORONTO

ACUTE INTESTINAL INTOXICATION IN INFANTS

(An analysis of seventy-five cases of the disease treated in the Hospital for Sick Children, Toronto, during the summer of 1921.)

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AND
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(Cases of infectious diarrhoea (dysentery) are not included in this series.)

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Acute intestinal intoxication may be defined as an acute metabolic disturbance with a predominance of gastro-intestinal symptoms, occurring in infants and young children, during the hot weather. It is characterized by its sudden onset, with collapse, vomiting, usually diarrhoea, frequently hyperpnoea, moderate leucocytosis, varying degrees of pyrexia and dehydration.

ETIOLOGY

(1) Predisposing causes.

The close relationship between the temperature of the air and the morbidity of this disease is perhaps the most striking feature concerning it. Nearly all the cases are seen in the summer and develop towards the end, or after a protracted hot spell. The mode of action of the heat has not been determined. Its effect has been attributed to direct heat stroke or to its action on the food by causing an increase in the number of organisms and consequent decomposition.

The perusal of the feeding histories of these children brings out two facts, (1) the small number who have been breast fed, and (2) the frequency of change in the feeding. In our series only five infants had been breast fed for any effective length of time, and none of these were breast fed at the onset of the illness. The second observation is important in that it indicates the presence of a previous gastro-intestinal upset. Acute intestinal intoxication is rare in a perfectly healthy baby. Among the artificial feedings, highly refined carbohydrate rich foods are most at fault. The morbidity and mortality are both increased by their use. Rational cow's milk dilutions, appear best when the nurse fails.

Feeding	*Number of Cases*	*Per cent. Mortality*
1. Rational cow's milk dilutions	17	50
2. Patent foods (rich in carbohydrates)		74
3. Cow's milk dilutions (not rational)	20	56.6

Age.—There is a gradual increase in morbidity up to six months, at which the peak is reached. Following this there is a steady fall, until a slight rise occurs again between eleven and twelve months. There is a steady fall in the percentage mortality, with increasing age.

(2) Active Causes.

The primary cause of acute intestinal intoxication might be (1) production of some toxic substance from the food by decomposition, (2) improper foods, (3) infection of the intestinal wall with bacteria, or, (4) abnormal absorption of catabolites from the bowel. Numerous bacteriological researches have failed to reveal a pathognomonic organism. Mellanby[1] in 1915 suggested the possibility of an amine base, which could readily be formed from histidine, a non-toxic substance, found normally in the bowel. He produced comparable symptoms in animals by injecting the B-imino adzalethyl ethylamine into their gastro-intestinal tract. From our experimental work[2] we consider the cause of acute intestinal intoxication to be a circulating toxin, produced in the mucous membrane of the bowel. Chemically the substance resembles closely an amine base, and possibly is the normal toxic substance found by Starling[3] in bowel mucous membrane. Further work is being done to determine whether the symptoms are due to an over production or increased absorption of this substance. Numerous organisms may play a secondary rôle in producing the poison by converting a harmless protein split product from an acid to a toxic basic substance.

Pathology

There are no characteristic pathological lesions. The commonest, and frequently only one seen is a fatty liver. This change was observed in 75 per cent. of our cases in the gross. Microscopically it is almost universally present and is lobular in type. The fatty changes were more marked in the very acute cases.

No pathognomonic changes were seen in the bowel. Cases having a history of previous gastro-intestinal upsets presented a catarrhal enteritis in some instances. Circulatory changes, varying from congestion and petechial hemorrhages, to, in two cases, actual ulceration were seen. These latter changes are those seen in any intoxication caused by proteins, or their split products.

The other organs were normal, unless some complications such as broncho-pneumonia had been present.

Symptoms and Signs

The onset of the intoxication is sudden. It is usually preceded, or accompanied by diarrhoea. Occasional cases with constipation occur. Convulsions are common. Refusal of food and vomiting are the rule. The temperature is usually 103°-105° F. The facies is characteristic, with staring, sunken eyes, open mouth, and very often muscular twitchings. Leucocytosis is moderate, 10,000-13,000 and could almost be accounted for by the concentration of the blood. Loss of weight is rapid. This is chiefly through salt and water loss through both bowels and lungs. The degrees of intoxication and dehydration were the same in most of our cases, and in no case was the intoxication greater than the dehydration, and the reverse was only noted twice. The liver is usually enlarged, and its size furnishes a rough indication of the degree of intoxication present.

Treatment

Prophylactic treatment affords the most hopeful means of combating this disease. The urgency for breast feeding is indicated by the greater

prevalence of the disease among the artificially fed. When artificial food must be used, proper dilutions of cow's milk are best. Such mixtures should be boiled to render them more constipating and to destroy bacteria. Overfeeding with either the breast or artificial food should be guarded against. Any diarrhoea should be treated promptly.

Abundance of fresh air, light clothing and cleanliness should be insisted upon.

During the summer of 1921, all infants suffering from the disease were put under the care of the authors. A definite plan of treatment (seen below) was drawn up, and infants on admission were placed in turn in the different groups. The only exception to regular rotation was made in cases of infants admitted in a moribund state and from whom we did not feel justified in withholding the benefits of exsanguination transfusion.

(A) Starvation period of 12 to 48 hours depending on degree of toxicosis.
Water by mouth—quantities recorded, saline subcutaneously, intraperitoneally and intravenously, followed by 2 per cent. lactic acid milk feeding.

(B) *Same starvation period—*
Water by mouth, glucose 5 per cent. subcutaneously, intraperitoneally and intravenously. 2% lactic acid milk feeding.

(C) *Same starvation—*
And fluids as in (A) but protein milk powder feeding.

(D) *Same starvation—*
And fluids as in (B) but protein milk powder feeding.

(E) *Same starvation—*
But exsanguination transfusion followed by fluids and food as in (C).

(F) *Same starvation—*
But exsanguination transfusion followed by fluids and food as in (D).

(G) Same as in (E) and (F) only using 2 per cent. lactic acid and 2% as food.

(1) Dehydration

Making up the water loss, which is always present is the most urgent treatment needed. As much water, or 5 per cent. glucose as the infant could take, was given per os. This amount was often small in amount, due to the infant's refusal to take water, and the frequent vomiting which ingestion of anything by mouth induced. Fluids were therefore given by the interstitial and intravenous routes. Normal saline and 5 per cent. glucose were used. Little difference was noted in the value of these fluids. Intravenous administration produced more immediate improvement, and was used in all cases at first. Interstitials were given two or three times a day, from admission until the child could take sufficient fluid by mouth.

(2) Toxaemia

A means of directly combating an unknown toxin is not easily found. The presence of a circulating toxin suggests, however, the removal of the medium in which it is, and its replacement by another fluid. Removal of the patient's blood, which contained the toxin, followed immediately

by transfusion from a suitable donor, suggested itself as a feasible means of doing this. The transfusion would also aid in treating the dehydration, as more blood was usually given than was withdrawn. Early in the summer cases fell into the exsanguination transfusion groups in rotation, later on the worst cases were all treated in this manner as it afforded their only hope of recovery. As will be seen in the table below, the cases most benefited by this procedure were those generally considered hopeless. The mild cases did just about as well when their dehydration was treated by saline or glucose only. The most striking benefits from exsanguination transfusion were seen in those very acute cases in which there was a sudden and rapid development of the symptoms.

Exsanguination Transfusion in Intestinal Intoxication

(1) Moribund on admission
11 cases—9 deaths
Mortality 81.8 per cent.

	Cases	*Deaths*	*Mortality*
Without exsanguination transfusion	6	5	83.3
With exsanguination transfusion	5	4	80

(2) In poor condition on admission
38 cases—20 deaths
Mortality 52.8 per cent.

	Cases	*Deaths*	*Mortality*
Without exsanguination transfusion	15	11	73.3
With exsanguination transfusion	23	9	39

(3) In fair condition on admission
25 cases—12 deaths
Mortality 48 per cent.

	Cases	*Deaths*	*Mortality*
Without exsanguination transfusion	16	8	50
With exsanguination transfusion	9	4	44.4

(3) An initial period of starvation, its length varying with the condition of the child, was instituted in all cases. Following this, dilutions of protein milk or 2 per cent. lactic acid milk were given. The protein milk was usually made from the powdered protein milk, but in certain protracted cases, the substitution of liquid protein hastened the cure. The stools became normal a little sooner on the protein milk, either liquid or powder, than on the lactic acid milk. The average time taken to effect this change was 29.5 days in the former and 32.4 in the latter, the minimum time with the protein milk powder was five days and with 2 per cent. lactic acid milk 14 days. Formed stools were obtained sooner with liquid protein than with the powder. No difference was observed in the amounts of these foods the child would take or in their influence on vomiting or other symptoms. As the stools improved the child was placed on higher concentrations of these foods or on a boiled 2 per cent. mixture. Carbohydrates were added gradually. Dextri-maltose is apparently the best of the sugars.

(4) Medicinal

Medicines are of little use in the treatment of this disease, aside from stimulants during the collapsed stage. Chalk mixtures were tried in a few cases without appreciable results.

The following table shows the effect of the different treatment groups on the mortality:

	Per cent. Mortality
A. (Saline 2% L.A.M.)	100 (1 case)
B. (5% Gluc. 2% L.A.M.)	50
C. (Saline P.M.P.M.)	33
D. (Glucose P.M.P.M.)	74
E. (Saline P.M.P.M. Ex. Trans.)	25
F. (5% Gluc. P.M.P.M. Ex. Trans.)	41.6
G. (Saline or 5% Gluc. L.A.M. Ex. Trans.)	53

P.M.P.M. Protein milk powder mixture.

Conclusions

1. Heat is effective in the causation of the disease.
2. There is a toxin, probably an amine base, produced in the bowel which circulates in the blood, and is capable of producing all the symptoms of the disease.
3. The only constant pathological finding is the fatty degeneration of the liver. Circulatory changes, such as are caused by injection of foreign protein, are fairly common in the mucosa of the small bowel.
4. Breast fed infants are in the minority of those affected.
5. Highly refined, carbohydrate rich foods are the foods used in the majority of cases.
6. Gastro-intestinal derangements, however mild, are noted in the histories of most cases.
7. It is of paramount importance to make up the fluid losses by interstitial and intravenous therapy. There is little to choose between normal saline and 5% glucose for this purpose.
8. Exsanguination transfusion offers the most successful means of combating the toxin particularly when there is a sudden and profound toxaemia. It should be tried, no matter how hopeless the case appears.
9. During the acute stage, the food should be fat and carbohydrate poor. Such feedings are protein milk and 2 per cent. lactic acid milk.
10. Medicines are of little use.

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[1] Mellanby. Quart. Journ. Med., 1915. 9-165-215.
[2] Boyd, Gladys. Arch. Ont. Med., Feb. 1923.
[3] Starling, J. Phys. 28- p. 335. 1902.

SOME NOTES ON DEMENTIA PRAECOX

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As a result of the work being carried on in the Psychiatric Clinic of the Toronto General Hospital, it has been made plain after several years of study that Dementia Praecox is even a greater problem than it was supposed to be in the past.

After having served many years in public institutions, and having examined many patients outside of them, I felt, when I resigned the

Superintendency of the Toronto Hospital for the Insane, that one of the important questions to be studied was that of the evolution of Dementia Praecox. The teachings of text books, to the effect that it is a disease generally not manifesting itself until the patients are over the age of twenty years or even thirty years, is manifestly wrong, and it is only when great opportunities of observing children in schools presented themselves that the true facts became apparent.

Precocious dementia is a better name than it appeared to be when it was first employed, and an analysis of seven thousand cases made most carefully, and with due regard to family history in the clinic revealed the fact that a very large proportion of children are to be found suffering from this disease in the earliest years of childhood. The work of Sir Frederick Mott pointed out the possibility of such a finding, and it is apparent that progress in the future is to be made along new lines, and if we are to eliminate this scourge of society we must reach sane conclusions regarding its evolution, and investigators of the future must follow different methods from those attempted in the past.

It is a field where the clinical investigator must co-operate with the pathologist and the well qualified student in psychology. As Sir Frederick Mott says, "There are two schools of thought, one physiogenic, the other psychogenic. The former attributes the mental disorder to a primary bodily pathological condition, the latter to a primary non-adaptable psychological function. The frequency with which psychoses and psycho-neuroses follow emotional shock connected with the sex impulse, the character of the dreams and their interpretations, the nature of the hallucinations and delusions in a great number of cases, suggest an origin in excitement or repression of the sex instinct. It was thought, and is still, by the psycho-analyst school that in the primary dementia of adolescence—dementia praecox, as it is called—there were no bodily changes sufficient to account for the signs and symptoms of mental disease. The physiogenic changes that are met with, it is stated by Jung, are the result, not the cause of the psychogenic disorder. Thus this author in his work, Analytical Psychology, states: 'The difference between us is as to the question whether, in relation to anatomical basis, the psychological disorders should be regarded as primary or secondary. The resolution of this weighty question depends upon the general problem as to whether the prevailing dogma in psychiatry—"disorders of the mind are disorders of the brain"—presents a final truth or not'".

The present work being carried on by the investigators in the Maudsley Institute in London, England, make it probable that we shall eventually be able to determine the exact nature of the brain conditions in the evolution of Dementia Praecox. However, the medical student is not much concerned at the present moment with the pros and cons of this argument, and I merely introduce statements of the authors quoted to show that there can be no question about the early development of this disease.

My own experience leads me to believe that the majority of cases of Dementia Praecox may be diagnosed at a very early age, and for this reason it is well to point out that this field for research is endless, and has been almost totally neglected. There is opportunity for another

Banting to invade it. When I go back to my school days it is too apparent that most of the children who eventually became recognized as suffering from Dementia Praecox could have been picked out then by any qualified psychiatrist when they were still young. Looking to the past it is a simple matter to come to this conclusion, and now that school populations are being carefully studied in many centres by well qualified psychiatrists, far more will be learned clinically than has been the case heretofore.

It furnishes another argument, too, in favour of having all mental examinations carried on in schools, conducted by men whose training has been psychiatric as well as psychological. In making surveys of schools the problem cases frequently resolve themselves into studies of mental disease, and as will be observed by statistics quoted, these are much more common than was supposed. Of 3,442 cases under 16 met with in our clinic, we learned that no less than eight per cent. could definitely be classed as suffering from mental disease or so called psychopathic inferiority.

Abnormalities of behaviour should always be regarded from a psychiatric standpoint, and much as the psychologists may protest against this there is no reason why they should do so, as there can be no justification for a charlatanry which professes to decide mental questions offhand without proper training along psychiatric lines. This position has been fostered by the readiness with which mental tests have been followed up by many quite incompetent to bring out their true significance or to appreciate their meaning. Take, for example, in Dementia Praecox, in nearly every instance a child will pass Binet Simon tests with success, and yet the abnormality is quite apparent. The things to be observed in school children, who are behaving abnormally, is to find out whether or not they have ideas of persecution, hallucinations of hearing and sight, mannerisms, stereotypies, and the other features which go to make the picture of Dementia Praecox. These children are not easily examined, as they are often suspicious, and it is by no means a simple matter to get them to reveal their delusions of persecution and their hallucinations. It must be pointed out, too, that the trained observer must clearly distinguish between the imaginings of some children, which are not unusual and are quite normal, and those which are the outcome of brain conditions, no matter what their origin. Stress must be laid on this point if we are to obtain a mass of evidence that will bring to us the solution of the mystery at present surrounding the evolution of Dementia Praecox. Post mortem investigations are so rare and so difficult to obtain that the groping must necessarily be slow.

The heredity influence, too, must never be lost sight of because, as a matter of fact, heredity plays a very important rôle in the development of this protean disease. It is often difficult to obtain direct evidence of a bad heredity, as people are by no means prone to unlock the doors to the skeleton's cupboard, and are so often tainted by the abnormal influence at work in their families that they cannot see what is patent to the acute observer.

The majority of cases of early Dementia Praecox show the tendency to be towards the development of the variety known as Hebephrenia,

the symptoms of which are plainly outlined in nearly all text books on insanity. In other words, the acute varieties of mental disease are not as common as those of less acute character. Many seclusive and silent children, whose differences from the ordinary child are plainly noticeable, are to be found in this group. They may be quiet, not anxious to play with their companions, and noticeably different from others in the class. It is difficult to engage them in conversation, often more difficult still to obtain information about themselves as they are on the defensive and not infrequently afraid of their imaginary persecutors. In nearly every large school several children of this type are to be found, and a careful and well thought out mental examination frequently brings to the surface the existence of delusions of persecution and hallucinations of hearing. Very often these hallucinations are in the incipient stage and do not amount to much more than autochthonous ideas. If hallucinations exist they may not be extensive, and may be limited to such ideas as that of the patient hearing his name called without being able to ascribe the voice to any particular person. At first, however, they are vague, but soon become elaborated and definite. The patients are often introspective, suspicious, and unhappy, occasionally ascribing their unhappiness definitely to certain individuals, although as a general rule the persecutions are of a vague nature. The following cases cited will illustrate the point.

Here, for example, is a rather extreme case, but might easily have been detected in early childhood had it come before a well trained psychiatrist. John Smith, age 20, Irish of Irish nationality, reached senior fourth book at fourteen, but did not pass the entrance examination as his mental peculiarities were becoming pronounced and he was too nervous to continue at school. Patient's parents were of very different ages, the father eighteen years older than his wife. When patient came to the clinic he talked freely and was full of delusions and hallucinations, but his disease was sub-acute, and in a very brief examination it became apparent that he had been insane from early childhood, the evolution of the disease being slow but progressive. Remembered that when he was a boy of four he had obsessions which have continued more or less all through his life. Was afraid of being impelled to cut himself with a knife, and it was with difficulty he could restrain himself from making the attempt. Had a desire, too, to jump from high places. Had the sensation of a tapeworm crawling up his throat. As he grew older was frequently obsessed with the idea that he was the victim of all sorts of worms; had visual hallucinations and saw tapeworms crawling all about him. His dreams were most depressing. Ideas of persecution developed early, and patient felt that everyone was looking at him, and saying contemptible things although he had not the slightest idea what those things were. The tendency toward developing obsessions of various kinds was persistent—could not remain on the verandah at times feeling that the roof might fall. Had a fear of all sorts of germs and developed well marked mysophobia. Had persistent hallucinations of smell and imagined that very offensive smells developed in almost every room he entered. Had the idea that he was likely to be killed while riding on the street car, and if possible would take a seat near the motorman so that he could see what was coming;

was not afraid to die but had a fear of being killed, and often felt impelled to get off the car and walk a few blocks then get on again. Recognized the fact that he was different from other children which made him seclusive. When a child was nervous and disliked to stand by the side of a lake or river because he had the impulse to jump in. The impulse was so well developed that on one occasion when standing on a dock and seeing a large fish swim by he jumped in the water and endeavoured to capture it without thinking of the responsibility or the danger. This case has now reached the stage where mental reduction is taking place rapidly, and will no doubt proceed to the usual termination if proper treatment is not offered. The only hope in this particular patient is that with proper supervision and vocational guidance the progress of the disease may be delayed. There is no hope of ultimate cure of course.

The importance of recognizing the existence of Dementia Praecox in its early stages may be realized when it is said that some of the paranoid types reveal the development of serious ideas of persecution and dangerous hallucinations at a very early age. It was splendidly exemplified in the Leo Rogers' case which has been discussed so much by the public lately. His acute attacks of excitement showed themselves at seven when he became violent, full of the wildest hallucinations, and showed bitter resentment to his imaginary persecutors. These attacks recurred from time to time until he was sent to the penitentiary at the age of fifteen, where the whole surroundings tended to increase his bitterness and his delusional state. If at that time he had received the right kind of treatment subsequent development and tragedies would, in all probability, not have occurred, and his anti-social tendencies might never have been observed. All this points to the fact that if treatment is to be of benefit in Dementia Praecox it must be resorted to early, even then it is by no means certain that a cure will follow, although it is undoubtedly true that great modification may be expected. For this reason it is exceedingly important to discover cases of early Dementia Praecox and have them placed under appropriate treatment which may be along psychological and psychiatric lines. Economy of space prevents me from going further into this important subject.

THE NATURE OF THE NERVE IMPULSE

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For many centuries nervous action was thought to consist in the flow of a liquid from some central reservoir out to the periphery of the body along the nerves. Thus, Vesalius taught that of the three souls, the vital (heart), the natural (liver), and chief (brain), the last engendered animal spirits which found their way to sensation and movement in the same manner that the vital spirit (blood) found its way from the heart. Déscartes accepted this view and elaborated a scheme by which the flow of animal spirits from the brain to the extremities might act automati-

cally. Blood upon being sent to the brain had its ethereal, more subtle particles screened out by the pineal body thus becoming animal spirits. Nerves in the form of tubes served as conducting pipe-lines from the pineal body to various parts of the body, and were provided with valves to prevent constant flow and loss of the precious fluid. The way in which this machine worked may be illustrated by the effect of heat on the hand. When the hand is held near the fire, particles of heat set in motion the spot touched, thus causing a pull on the nerves, and this in turn opens the valve to the pineal body. The animal spirits then flow out along the nerves and the person has the sensation of heat. Fantastic as this explanation seems to us to-day, it was of value in that the nerve impulse, a vital phenomenon, was assumed to obey the ordinary laws of mechanics and physics.

With the discovery of electricity and Galvani's fortunate observation of movement in a dish of frogs intended as a delicacy for his sick wife, and which he had inadvertently placed near an electrical machine in motion, the nerve impulse became associated with electrical forces. The older idea of the flow of a ponderable liquid was changed, it was now the flow of an imponderable electric current.

The middle of the last century saw great activity in the realm of muscle-nerve physiology, and the discoveries of Du Bois-Reymond using his specially constructed coil for stimulation, the observations of Matteucci on the rheoscopic frog, the enunciation of Pflüger's laws, and many other additions to physiological literature were made at this period. The intimate and fundamental relation between the nerve impulse and electrical forces was especially well shown by Du Bois-Reymond's (1843) "negative variation" or action current. The injured end of a nerve or muscle was found always to be electro-negative to the uninjured part, and if these two points were connected by suitable conductors to a sensitive galvanometer a constant current could be demonstrated flowing from the uninjured to the injured portion. If the nerve was now stimulated there was a momentary diminution of this current of injury as the nerve impulse passed the nearer electrode.

Since the time of Du Bois-Reymond the usual source of artificial stimulation for nerves has been the application of an electric current. If, then, upon sending an electric current through a short distance of nerve there is initiated a nerve impulse which in turn can manifest itself as an electric current, what more natural than to suppose that the nerve impulse itself is nothing more than an electric current passing along the nerve in precisely the same manner that it is conducted along a copper wire? It may have been some such consideration as this which led Johannes Müller in 1846 to state that the velocity of the nerve impulse could never be determined since it would be impossible to compare points far enough apart, as had been done in the case of the movement of light. Nevertheless, Helmholtz six years later did it, and found it to be less than 40 m. per second at 21° C. for the frog. He remarks that "as long as physiologists thought it necessary to refer nerve actions to the movement of an imponderable or psychic principle, it must have appeared incredible that the velocity of this movement could be measured within the short distances of the animal body". This conception of the nerve impulse is still with us. Only this year two authors have

written on "The physico-chemical basis of psychic phenomena" as if nerve impulse and electric current were one and the same thing.

Thanks to the brilliant work of Adrian, carrying on the torch of his gifted teacher, Keith Lucas, we have made great strides in our knowledge of the nature of the nerve impulse. We are still far from a complete understanding of this most fundamental life process, but we can say with certainty that we must abandon the idea that it is merely the conductance of an electric current similar to that in a copper wire. In 1912 Adrian showed that "the size of the propagated disturbance at any given point in a nerve fiber depends only on the local condition of the fiber at that point and not on the previous history of the disturbance before it arrived there". In other words, the force of the nerve impulse is not dependent upon the push of the stimulus which sets it off. When the conductivity of any portion of the nerve is lowered, *e.g.*, by narcotics, cold, etc., if the impulse can only pass over this area, it will pick up its full force again upon reaching a normal part of the nerve and will continue on at its original strength. The truth of this proposition is demonstrated yearly in class exercises by medical students in several universities on this continent.

This was the first real proof of the "all-or-none" relationship between stimulus and response in the case of nerve. There appeared the next year a criticism of Adrian's work by Lodholz. He reported that a weak stimulus gave rise to an impulse which would not pass through a narcotized area of nerve, whereas the impulse from a stronger stimulus would. At first sight it appears that instead of an all-or-none relation, the nerve impulse can after all be graded in its intensity and depends upon the strength of the stimulus applied. In 1914 Adrian repeated Lodholz's experiment and found his statement true within certain limits. The strength of stimulus necessary for minimal contractions rose during narcosis, and before complete extinction of the propagated disturbance it reached the same value as for a maximal contraction. But the strength of stimulus required to give a maximal contraction did not change, although the height of the maximal contraction diminished the longer the narcotic was allowed to act, until there was finally no response. This can only mean that "the effective strength of stimulus for any one nerve fiber remains absolutely unchanged until the moment when conduction in that fiber is completely suspended". We are therefore justified in stating that "in any nerve fiber under normal conditions there is an all-or-none relation between the strength of stimulus and the size of the propagated disturbance which follows it", and the analogy of the nerve impulse to simple conduction of an electric current in a wire does not hold.

If the source of energy for the nerve impulse lies in the nerve itself we may enquire whether we are dealing with a chemical or physical action. Its temperature coefficient turns out to be 1.79, slightly less than 2. From this we can conclude merely that the process is not wholly a chemical one. This is borne out by the following facts: (1) only the slightest traces of CO_2 are evolved during the passage of the nerve impulse—there is a certain definite amount liberated as recent experiments show, but it is a very small amount indeed; (2) if there is any heat evolved it is less than one one-hundred-millionth of one degree centi-

grade; (3) it is practically impossible to fatigue a nerve, therefore that there is no depletion of an energy-affording substance such as we find in muscular fatigue.

The one phenomenon which yields the most information as to the possible nature of the nerve impulse is the "negative variation" which Du Bois-Reymond described in 1843. We can best explain the current of injury by supposing that an electrolyte within the nerve fiber dissociates into two ions, one of which is able to pass through a semi-permeable membrane within, or more probably covering, the axis cylinder, the other is unable to do so. This will establish a difference of potential on either side of the membrane. Now if we stimulate the nerve, the moment the impulse reaches the near electrode the galvanometer returns to zero, showing that the distribution of ions must now be equal on both sides of the membrane and therefore the membrane must have lost its semi-permeable character becoming completely permeable. It takes an appreciable time for the ions to assemble and disperse, hence the latent period and refractory period. It has been shown indirectly that nerve does become more permeable during excitation, and this is certainly true of muscles and glands which may be classified with nerves as excitable tissues and from this point of view have the same characteristics as nerves.

The modern view is, therefore, that changes in permeability in the nerve fiber and the consequent movement of ions account for the nerve impulse, and mathematical formulae to express stimulation of nerve, worked out by Hernst, Hill and Lucas on these assumptions, seem to show that this is indeed the true explanation of the phenomenon.

BUTTER-SOUP IN INFANT FEEDING

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The first description of the C-K butter-flour mixture, commonly spoken of as butter-soup, appeared in the German literature in 1918, when Czerny and Kleinschmidt published an account of some of their experiences with its use in infant feeding. Its usefulness for infant feeding under certain conditions is now generally recognized and in its own field it holds a firmly established place. It is especially recommended for very young, small and weakly infants, particularly prematures, when breast feeding is not practicable. There is general agreement that it should not be used in acute digestive disturbances, decomposition or whenever there is definite indication of a food intolerance, whether of fat or of carbohydrate. In regard to its use in marasmus and during recovery from severe digestive disturbances there is a difference of opinion. Uniformly good results have not been obtained under these conditions, but the failures may have been due to the presence of a food intolerance which was either unrecognized or disregarded.

Among the clinical results of butter-soup feeding which have brought it into high favour are a rapid and uniform gain in weight, improvement

in colour of the skin and in turgor, the deposition of sub-cutaneous fat, a tendency to sleep well, a generally happy and comfortable appearance, and the ability to withstand mild parenteral infection. Infants being fed on butter-soup have frequently been observed to maintain their steady gain in weight throughout a mild or even moderately severe infection.

The original directions for preparing butter-soup are as follows:—

Butter-Soup 20 oz. Mixture

(as prepared at the Hospital for Sick Children)

Butter 7¼ teaspoons (level). Flour 14¾ teaspoons (level).
Sugar 5¼ teaspoons (level). Water 17½ ounces.

Heat the butter over a low fire, using an asbestos mat, for seven minutes, until butter turns a brownish colour and ceases foaming.
Add flour and sugar, blend thoroughly.
Add cold water, stir constantly until mixture thickens.
Place over steam, cook thirty minutes.
Cool, strain, measure and make up to twenty ounces with cold boiled water.

The caloric value of this compound, which may be called the butter-soup stock, is approximately 28 to the ounce. For a child weighing not over seven pounds a mixture of two-thirds butter-flour stock and one-third whole milk is commonly used. The caloric value of such a mixture is approximately 24 to the ounce. For larger children the proportion of three-fifths butter-soup stock to two-fifths whole milk is sometimes employed. Owing to the somewhat concentrated character of the food a smaller volume of butter-soup is given than that commonly used with dilutions of cow's milk. It is, however, a high calorie food and usually provides more than seventy calories to the pound of body weight. For example, an infant weighing seven pounds would be given the two-thirds mixture and might reasonably be allowed twenty-one ounces, that is, seventy-two calories to the pound. The formula is sometimes modified to the extent of having added one-half to one ounce of casein flour to the day's food and sometimes the sugar is omitted. When the weight curve comes to a standstill on butter-soup feeding, the addition of protein to the mixture or a temporary change to a dilution of cow's milk will usually bring about a renewal of the weight gain.

The good results obtained with the use of butter-soup have been ascribed to various causes, among which are the following: its general resemblance in composition to breast milk, the high fat content in a form that can be tolerated; high caloric value; small water content; high sodium chloride; the influence on the stool flora, which is changed by butter-soup feeding from the gram negative to the gram positive type corresponding to the flora of the stools of breast fed infants; and the driving off of the volatile fatty acids. The removal of the volatile fatty acids can hardly be an important factor since there is so little of them present in good butter. On the other hand an abnormal production of these acids from the fermentation of the abundant carbohydrate present in this food might be looked for. This apparently happens sometimes when the food is used under conditions of food intolerance, and a serious digestive disturbance results.

There is abundant reason to believe that the rapid weight gain with

butter-soup feeding is not to be attributed to water retention. Edema is rarely observed in infants taking this food and sweating is common among them. Moreover the food is concentrated and the fluid intake comparatively small. The sodium chloride intake with butter-soup may be rather high if especially salt butter has been used in making the mixture. However, four children on whom metabolism studies were made showed no large water retention, while their actual retention of chlorine was very small.

The question has been raised whether there is any danger of rickets developing in infants fed on butter-soup, because of the low total salt content and consequently low calcium content of the food. It must be admitted that craniotabes has been found to develop in a small number of infants being fed on butter-soup and that it rarely has disappeared under this kind of feeding if already present when the feeding was begun, but that on the contrary it has sometimes definitely increased. In such cases either the food should be changed or therapeutic measures taken to correct the rachitic tendency. In all the observed cases the craniotabes promptly disappeared with proper treatment.

It is not the rule to keep infants on butter-soup for long periods, but in many cases this has been the food for five or six months with no ill effects.

The stools with butter-soup feeding resemble those resulting from breast feeding in colour, consistency, odour, acidity and their high proportion of fat. They differ in being much greater in quantity for a corresponding period of time.

Metabolism studies have been made on infants being fed on butter-soup, which show results apparently inconsistent with the clinical effects of the food. With normal breast fed infants there is an average retention of from 90 to 95 per cent. of the fat intake and from 20 to 25 per cent. of the nitrogen intake. With butter-soup feeding, on the contrary, the fat retention was low, with two infants 72 to 74 per cent. and two others 81 to 82 per cent. of the fat intake. In only one was there an excellent nitrogen retention. Of the others, two had a small retention and the fourth a negative balance. The salt retention of three of the children was better than their nitrogen retention, while the fourth, the one who had a negative nitrogen balance, had also a negative salt balance.

This striking difference between butter-soup feeding and breast feeding in respect to the retention of important food components is due mainly to the large daily amount of feces with butter-soup feeding. While the average daily dried weight of the stools of normal breast fed infants is from 3 to 5 grams, that of those fed on butter-soup varied between 8 and 15 grams. As the per cent. of fat in these stools was at least as high as the average per cent. of fat in stools of breast fed infants, the explanation of the comparatively large loss of fat by infants taking butter-soup is evident. The low retention of nitrogen and of salts is to be accounted for partly by the large size of the stools and partly by the larger output in the urine than that which occurs with breast fed infants. Of the organic components of the food, the carbohydrate alone seems to be utilized as well with butter-soup feeding as with breast feeding. There appears to be normally a similar degree of fermentation and of acid production with both kinds of food.

Since there is some question in regard to the adequacy of the calcium intake with butter-soup feeding it is interesting to note that three out of four infants observed had an excellent calcium and magnesium retention. The fourth retained very little calcium and had a negative balance of magnesium. He was the child who had a negative nitrogen and total salt balance. He was 9½ months of age and may not have been receiving an adequate intake of protein or of salts.

In the four cases studied there was found to be a large excess of inorganic acids over bases in the urine, though the total salt content of the urine varied greatly. The feces showed the reverse condition. This would indicate that there was a relatively large amount of organic acids in the feces holding the bases in combination, thus causing a low output of bases in the urine. Calculation shows that the higher fatty acids in the stools were not present in sufficient amounts to account for all the calcium and potassium excreted and therefore that acids presumably arising from carbohydrate breakdown must have been partly responsible for the withdrawal of bases in the feces. In only two out of nine cases, however, was the actual loss of bases large enough seriously to endanger the retention.

The metabolism results indicate that from the point of view of utilization of some of the food components, butter-soup is relatively not an efficient food. Apparently only in respect to carbohydrate utilization can it bear comparison with breast milk. Since, however, in certain types of cases, in which a substitute for breast milk is frequently required, butter-soup affords clinical results almost equal to those obtained with breast feeding, the wasteful use of fat, protein and salts resulting from its employment will be overlooked and it will doubtless continue to be held a valuable addition to the resources in infant feeding.

For further details in regard to the clinical results obtained with butter-soup feeding and for tabulations and discussion of metabolism findings the reader is referred to the article of which this paper is in the main a resumé, "A Clinical and Chemical Study of Butter-Soup Feeding in Infants". Alan Brown, A. M. Courtney and I. F. MacLachlan. Am. J. Diseases of Children, 24, 368, 1922.

THE NEPHRITIC TEST MEAL

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The method of testing kidney function by observing its ability to excrete water, salt and nitrogenous substances, has become a simple matter of observing the volume and specific gravity of a series of urines collected throughout the twenty-four hours of the test period. This simplicity, however, has only been attained as the result of a long series of researches, many of which seemed to be unnecessary and futile pieces of work.

In its original form the nephritic test meal was devised to meet the German dietetic habits. It has been modified by Mosenthal to make it more suitable for this continent, and as such consists of three meals on the test day with a quantity of added salt:

Breakfast: porridge, bread and butter, milk and coffee.

Dinner: soup, meat, potato, vegetable, milk pudding, bread and butter and tea.

Supper: eggs, bread and butter, tea, milk and fruit.

The diet contains 1760 c.c. of fluids, 8.5 gms. of salt, and 13.4 gms. of nitrogen, together with small quantities of purines to act as diuretics. This is what may be termed the standard form of the nephritic test meal, the details of which can be found in many modern text-books. The meals are moderate in amount, yet they are large enough to test the excretory function of the kidney to a high degree. The amounts of fluid, salt, and nitrogen, are such that because of their amount it is possible in many instances to find evidence of failure of kidney function earlier by this test than by any other. Nevertheless, although the meals would be considered as moderate by the normal individual in good health, or by a person who might be feeling perhaps just a little below *par*, they would constitute a decided difficulty to a seriously sick person. Partly on this account, and partly because it was desired to extend the usefulness of the test by removing from it as many restrictions as possible, other diets were devised, which differed markedly from the standard in their content of salt and nitrogen, and also sometimes in their water intake. The response of the kidney to the newer diets was very similar to that shown on the standard diet, so gradually there has grown up the belief that the character of the diet is immaterial, provided the urine is properly collected. This is true when one is dealing with a patient in whom the kidney function is markedly disturbed. It may not be true when one is looking for a nocturnal polyuria as early evidence of failing renal function. With this exception the response by the kidneys to the different types of meals is very similar. Whatever type of meal is used, whether a high or low protein, or the patient's ordinary diet, the rules for the collection of the urinary specimens should be duly observed. The specimens should be collected punctually at two-hour periods throughout the day; the night specimen should be collected separately, and three hours should elapse between the evening meal and the commencement of the collection of the night urine. Also, nothing should be taken between meals or during the night period. Because of the times of collection of the urines during the day period, the test is sometimes known as the "two-hour" test.

The response given to the test by normal individuals has shown that attention must be centred around two points. These are the variations in specific gravity of the day urines, and the volume and specific gravity of the night urine. The value of this latter observation is greater on the standard test than on its variations. In the normal individual we usually find a variation in the specific gravities of the day urines of at least seven points, *i.e.*, the difference between the minimum and maximum observed specific gravities is usually at least seven units when the specific gravity of water is called 1000. Thus if the lowest specific gravity observed during the day is 1010 then the highest should be 1017 or more. If the conditions of the test have been strictly kept, the volume

of the night urine is less than 700 c.c. and its specific gravity is 1018 or over. An amount of urine over 700 c.c. is regarded as a nocturnal polyuria. Nycturia is looked upon as one of the early signs of nephritis, and in obtaining the history or symptoms of a patient supposedly suffering from nephritis it is usual to enquire on this point. Frequency of micturition, however, as indicated in the replies of the patient to your questions, does not necessarily mean nocturnal polyuria. The urine may be voided two or three times during the night without an increased volume accompanying the frequency. In some cases, a urethritis, prostatic hypertrophy or other local source of irritation may be found to be the cause; in others, apparently there seem to be no other reason than nervous habit. Frequency of micturition then does not necessarily mean nycturia. The volume of the urine passed as the night specimen must be measured. It is at this point that there is some divergence in the results shown by the test when using different diets. On the standard test, with its relatively high amount of protein, nycturia is often shown, when it appears as absent on low protein diets. This is because on a diet of high protein content part of the nitrogen from the evening meal appears in the night urine. If the excretion of nitrogen during the day has been adequate, then the amount left to be excreted during the night is small, and there is sufficient water from the day's intake combined with that produced in metabolism to ensure its excretion. If, on the other hand, the excretion of the day's nitrogen has become impaired, and a large proportion has been left for excretion during the night, then an extra amount of water will be demanded, with a resulting nycturia. On a low protein diet, even with an impaired function, so small an amount of nitrogen may have been presented to the kidney for removal, that it has been able to fulfil satisfactorily this small task, whereas it would assuredly have failed with larger amounts of nitrogen. Hence with the low protein diet there may be no nycturia. It would also follow that a nycturia appearing on a low protein diet is of graver significance than one observed on a high protein diet only.

It is usually stated that the specific gravity of the night urine shall be 1018 or over. This is generally true, but a sufficient number of exceptions have been observed to make it impossible to treat as pathological, cases in which the specific gravity is less, especially if the lower figure is combined with a low volume.

In considering the response to the test given in disease, it must be remembered that many factors go to influence the secretion of urine, and that a disturbance of any one of them may alter the result from the normal. The pathological conditions, however, which one may encounter, and which are likely to affect urinary secretion and thus the character of the response to the test, are well recognized. They might be classified under two headings; some are extra-renal in character.

A. Extra-Renal

I. General blood and circulatory disturbances.

II. Local causes affecting renal circulation or secretion. Under the first division there would occur primary and secondary anaemias, and passive renal congestion consequent on myocardial failure. Strictly speaking the arteriosclerotic kidney would belong to the same class.

The responses given to the nephritic test meal however are by no means the same in these conditions.

Under the second division would be found pyelitis, cystitis and hypertrophied prostate; pyelonephritis might also be included in this class though it is an intra-renal and not an extra-renal cause for loss of function. It has, however, a common origin with pyelitis as an ascending infection. Another series of pathological conditions which affect the urinary secretion and thus the character of the response to the test, are naturally to be found in the kidney itself.

B. Intra-Renal

I. Renal growths.

II. Types of nephrosis and nephritis.

It will be evident from the foregoing that in applying the nephritic test meal to the study of the loss of kidney function in a patient, that attention must be paid to extra-renal conditions. The removal of a hypertrophied prostate, the subsidence of a pyelitis, the cure of a severe anaemia, may be followed by great functional improvement, while a similar test meal picture in chronic nephritis would indicate a speedy fatal termination. The following are the main variations usually encountered in the response to the test:

Simple Acute Nephrosis. Oliguria with very high specific gravity; the night urine is also low in volume with high specific gravity. This condition is usually associated with edema, and during its subsidence a test meal will show total polyuria with low or medium specific gravity. Nycturia will be present under these conditions.

Chronic Glomerulo-Nephritis. In its end stages the nephritic test meal gives very distinct findings; there is total polyuria with a low fixed specific gravity. Nycturia is marked.

Usually glomerulo-nephritis does not occur in a simple form, but is mixed with other types of lesions. Under those conditions the responses to the test will vary depending upon the extent and intensity of each particular lesion. Thus in acute diffuse glomerulo-nephritis, accompanied by edema, there may be an oliguria instead of a polyuria, and this may be combined with a low specific gravity instead of a high one as might be expected from the oliguria alone.

Passive Renal Congestion (Myocardial failure). This condition, though the origin of the loss of kidney function is extra-renal, is nevertheless so common as to warrant its inclusion. Here the volume of urine is reduced, with a constant specific gravity usually about 1020. It is accompanied by edema, and nycturia is often present, though this latter may sometimes arise from a slow subsidence of the edema.

In conclusion it cannot be emphasized too strongly that the results given by the nephritic test meal cannot be interpreted without reference to the accompanying clinical condition. This is true of all chemical tests, especially those used for the determination of function. Taken by themselves they may prove quite misleading, and it is only when they are closely allied with clinical observation that they fall into their right place, and become of value to the physician.

THE STUDY OF ELECTRICITY IN MEDICAL EDUCATION

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It has become a common practice in recent years to make two great divisions in the courses of study for students of medicine:

(1) Pre-medical courses which deal chiefly with the fundamental sciences upon which special branches of medicine, such as laryngology, ophthalmology and radiology, are said to depend.

(2) Medical courses which deal with (*a*) subjects which are apparently somewhat remotely related to the subjects of division (1) such as anatomy, medicine, surgery, etc., also (*b*) subjects which are regarded with some uncertainty as medical subjects or fundamental sciences, such as Biology, Biochemistry and Physiology.

This classification of courses has arisen, partly at least, because of the extensive development through research of the close interrelationship of science and medicine, which made it highly desirable that medical colleges should become associated with universities where laboratory facilities and instructors specially trained in science became available. Thus it is that medical education of former days in the fundamental sciences has given place to the more highly specialized and intensive education of to-day. This new system of training has indeed promoted habits of thoroughness and precision in the student and has extended largely his knowledge of the fundamental sciences. The change, while evidently progressive, has not, however, been free from undesirable elements. The official designation of the courses in science as pre-medical has perhaps had some share in creating an atmosphere in which these pre-medical courses have come to be regarded as non-medical or at least it has given some support to the similar immature view of many students when they commence the study of medicine. Developments which have arisen from this condition may be portrayed by a consideration of the study of electricity as a pre-medical course in medical education. A brief, almost casual study, of the subject is made by the student in the first year and he successfully passes an examination which of necessity can hardly be more than a mild test of very general knowledge of the subject. This must suffice as he passes to the study of subjects which are yearly undergoing development in which electrical elements have an ever increasing importance, unless, indeed, he avails himself of the opportunity to return to the study in later years through the option courses which have been arranged.

It is not a matter of surprise that when he assumes the two great responsibilities for which he has been preparing himself, viz., (*a*) as a professional medical man, (*b*) as one of those engaged in the great work of extending the horizon of medical science, he should find himself but indifferently equipped and the results of his efforts somewhat unsatisfactory. It is perhaps of minor importance but exasperatingly irritating to find in the discharge of his duties as a professional man those who will not only call attention to his incomplete training, but will callously attempt to substitute therefor, their own ignorance, deceit, and charlatanry with the aid of a mystifying collection of elec-

trical apparatus. This is probably only a passing phase in professional medical life. In Great Britain it was met by the establishment in 1919 of a period of intensive training in courses distinctly electrical in character followed by an exhaustive examination, success at which is indicated by the award of a diploma in Radiology and Physiotherapy. In June 1921 there were eighteen successful candidates for the Diploma and the number at recent examinations was still larger. The number of students in these courses has increased yearly. At first it was, perhaps, considered a luxury, but now it has become a necessity. As yet no legal status has been sought, but there is in rapid process of formation a profession in fact within the profession of medicine.

Of much more importance, however, is his position when he assumes the second and much greater responsibility,—that of a research worker. He finds indeed that electricity is not a pre-medical subject but essentially a medical subject, and that his study of the subject has been meagre and inadequate. For a time he gropes discouragingly with such things as ions and ionizations, hydrogen ion concentration, nerve and muscle stimulation and reaction, radiation of various kinds and their physiological and pathological relationships, and it is not a matter of surprise that few are able to assume their responsibility of research with confidence and hope of success. Electricity is indeed a medical subject. When the student is studying hydrogen ion concentration he uses the symbol $\frac{+}{H}$ and he perhaps hardly realizes that the subject of his study is not the hydrogen but the positive charge and that the combining equivalent weight of the hydrogen is hardly of more importance than the atomic number which is the number of elemental positive charges. Or when he experiments with electrical stimulation of muscles and nerves or the application of radiation to organisms that the results he observes have to do only with positive and negative charges.

In brief the study of electricity for medical education should not only be so definite and precise that he may get a thorough acquaintance with the foundation principles, but it should also be so exhaustive that he will clearly understand the developments which have established the strong probability that in a very considerable part of his work he is dealing only with electrical charges, and that it is of considerable importance to him to understand as fully as possible their distribution, interactions and properties generally. With such intensive study electricity may become to him a real medical subject and the probability of success attending his efforts in research should be considerably increased.

RUDYARD KIPLING ADDRESSES ROYAL COLLEGE OF SURGEONS

Man's Long Quest

The anniversary of the birth of John Hunter was celebrated by a dinner at the Royal College of Surgeons of England in Lincoln's Inn Fields, recently. The principal lay speaker was Rudyard Kipling. He said his excuse for speaking in such an assembly was that he was by

calling a dealer in words, and words were, of course, the most powerful drug used by mankind. He continued:

There is a legend which has been transmitted to us from the remotest ages. It has entered into many brains, and coloured not a few creeds. It is this:—Once upon a time, or rather, at the very birth of Time, when the Gods were so new that they had no names, and Man was still damp from the clay of the pit whence he had been digged, Man claimed that he, too, was in some sort a deity. The Gods were as just in those days as they are now. They weighed his evidence and decided that Man's claim was good—that he was, in effect, a divinity, and, as such, entitled to be freed from the trammels of mere brute instinct, to enjoy the consequences of his own acts. But the Gods sell everything at a price. Having conceded Man's claim, the legend goes that they came by stealth and stole away this Godhead with intent to hide it where Man should never find it again. But this was none so easy. If they hid it anywhere on Earth, the Gods foresaw that Man, the inveterate hunter —the father, you might say, of all hunters—would leave no stone unturned or wave unplumbed till he had recovered it. If they concealed it among themselves, they feared that Man might in the end batter his way up even to the skies. And, while they were all thus at a stand, the wisest of the Gods, who afterwards became the God Brahm, said:—"*I* know. Give it to me!" And he closed his hand upon the tiny unstable light of Man's stolen Godhead, and when that great hand opened again, the light was gone. "All is well", said Brahm. "I have hidden it where Man will never dream of looking for it. I have hidden it inside Man himself." "Yes, but whereabouts inside Man have you hidden it?" all the other Gods asked. "Ah!" said Brahm, "That is my secret and always will be unless and until Man discovers it for himself."

Thus does the case stand with Man up to the present. Consider for a moment the pathos of the poor brute's position. You all know the common formula for him. "Born of woman, on woman designed to beget his like—the natural quarry of the Seven Deadly Sins, but the altar of an inextinguishable hope." Or, more scientifically (I regret I am not a scientific person), he might be defined as "An imperfectly denatured animal intermittently subject to the unpredictable reactions of an unlocated spiritual area".

And it is just this search for this unlocatable spiritual area, whether it be a growth or a survival, which has preoccupied man from that day to this. The priest and the lawgiver have probed and fished for it through all the ages; but, more than any other, through all the ages the leech, the medicine man, the healer has been hottest on its track. He has searched wherever he dared, openly or furtively, in safety or at the risk of his life. In the early days the astrologer-physician, as he called himself, dreamed that the secret of man's eternal unrest was laid up in the sun, moon, and stars; and consequently, since all created things were one in essence, that a universal medicament for man's eternal woes would be discovered upon earth. So he searched earth and the heavens for those twin secrets and sacrificed himself in the search as a matter of course.

Later, when the embargoes on the healing art were lifted, when at last he was permitted to look openly into the bodies of mankind, the

nature of his dreams changed for awhile. He had found more wonders beneath his knife than earth or the planets had heretofore shown him. And that was barely ten generations ago. Once again, the surgeon, as he had become, renewed his search and, once again, sacrificed himself in the search as his passion drove him. There is no anæsthesia so complete as a man's absorption in his own job.

In the teeth of the outrageous, the absurd disabilities imposed on him, Man, the imperfectly denatured animal, who cannot trust the evidence of his own senses in the simplest matter of fact; whose evidence on the simplest matter is coloured by his own iniquities; Man, always the hunter, went up against the darkness that cloaked him and every act of his being, to find out what order of created thing he might be. He called it scientific research. It was the old quest under a new name. But, this time, the seekers who headed it, unlike the priest and the lawyer, admitted that they knew very little. Experience had taught them to be humble. For that reason, their knowledge was increased. They moved forward into areas of the body which, till then, had denied themselves to man's hand. They were turned back, without explanation, from other areas which, as yet, would tolerate no spying. They were bewildered by mysteries which some new marriage of observation upon accident, some predestined slip of the knife, resolved into mysteries profounder still! Is it any wonder that the old dreams came back? The dream of the essential unity of all created things—the dream that, some day, that which men call life might be led into matter which men call dead—the boldest dream of all, that eventually Man might surprise the ultimate secret of his being where Brahm had hidden it, in the body of man. And meanwhile their days were filled, as yours are filled, with the piteous procession of men and women begging them, as men and women beg of you daily, for leave to be allowed to live a little longer, upon whatever terms. Is it any wonder, gentlemen of the College of Surgeons, that your calling should exact the utmost that man can give?

EXCERPTS AND REVIEWS

In the *British Medical Journal* of January of this year there appeared an article on "The Investigation of Dyspeptics" by John Ryle of Guy's Hospital. Dr. Ryle presents the subject of gastro-intestinal investigation and diagnosis so concisely and so admirably sums up the salient points in this extensive field of medicine that the following excerpts should prove of special interest to the readers of this journal.

Classification of Dyspepsias

A. Dyspepsias due to organic disease of the stomach (including pylorus and duodenum)—for example, ulcer, carcinoma, gastritis, and the end-results of operations.

B. Reflex dyspepsias due to organic disease elsewhere in the alimentary tract—for example, gall stones, appendicitis, etc.—and to central nervous disease.

C. Dyspepsias resulting from the failure to lead a physiological life—for example, overeating, undereating, inefficient mastication, drinking, smoking, overworking and lack of exercise, constipation.

D. Dyspepsias due to general states of ill health—for example, early active and chronic latent tuberculosis of the lungs, anaemias, states of debility associated with muscular hypotonus, loss of natural fat deposits, and consequent visceroptosis.

E. Dyspepsias due to nervous tricks, emotional unbalance, nervous exhaustion, worry and anxiety states; and including air swallowing, hysterical regurgitation and vomiting, overconcentration on digestive processes, attempts to express a psychological unbalance as a physical abnormality, undue appreciation of normal processes in apprehensive individuals, etc.

Two hundred and sixty-seven unselected cases were analysed. The percentage incidence of cases in the various groups was as follows: Group A, 33 per cent.; Group B, 18 per cent.; Group C, 12 per cent.; Group D, 12 per cent.; and Group E, 24 per cent.

. . . . I propose briefly to discuss the physiological significance of such common symptoms as epigastric pain and discomfort, fullness, vomiting, nausea, flatulence, loss of appetite, furred tongue, "heartburn", and "acidity".

Epigastric pain may, of course, be due to other than gastric phenomena, and is met with, for instance, in cardiac and gall-bladder disease. When originating in the stomach it is, according to modern views, associated with a general or local increase in intragastric tension, commonly resulting from pyloric or gastric spasm, which impedes the onward passage of fluid, gaseous, or semi-solid contents. In short, it falls into line with other pains produced in hollow viscera; for whether we are concerned with angina pectoris, renal colic, or the pain of duodenal ulcer, we are not far from the truth in claiming that the pain is due to an abnormal increase in intravisceral tension, and that in each instance the pain is best relieved by factors calculated to lower intravisceral tension. Amyl nitrite, which lessens the peripheral resistance by vasodilatation, passage of a calculus, food or belladonna overcoming the reflex hypertonus of the pylorus, are all examples of these relieving factors. Gastric discomforts are due to abnormal motor behaviour falling short of that requisite for the production of actual pain. I find it a useful leading question to put to patients complaining of epigastric pain, "Is it really pain or would it be better described as discomfort?" Real pain is always much more suggestive of an organic lesion than vague discomfort.

A sense of fulness may be present in both hypertonic and hypotonic stomachs. A man with an abnormally hypertonic gastric musculature may feel a great sense of fulness after meals, the muscle here being responsible for the tension. On the other hand, in atonic and dropped stomachs feelings of fulness and heaviness are often experienced, the food in this case, inefficiently propelled and churned, producing the sense of tension by its weight. On the whole, fulness is more often a symptom of hypotonic than hypertonic gastric musculature.

Vomiting, apart from that which is due to organic narrowing of the pylorus or mid-gastric area, may result from reflex spasm at either site, though the act of vomiting itself involves the co-operation of the

diaphragm and abdominal muscles. The stimulus to vomit in dyspeptics may be an organic lesion, such as an ulcer, gall stones, or appendicitis; or it may be emotional; or there may be an emotional exaggeration or perpetuation of vomiting originally due to an organic cause.

Nausea, which is peculiarly frequent in gall stones, pregnancy, and alcoholic gastritis, and not very frequent in other dyspepsias, may also be regarded as a symptom of reflex disturbance of motor function. It is a symptom at present inadequately investigated. It may be associated with pyloric closure or failure to relax, patency of the lower oesophagus, an inhibition of normal peristaltic activity, but this needs confirmation. It appears to be felt partly as a general malaise, partly in the stomach and partly in the gullet, and may certainly be induced by mechanical irritation in the gullet.

. . . . . .

I will now attempt to summarize for you the important features of the various groups of dyspeptics.

Groups A and B

Gastric Ulcer.—Comparatively high incidence in women. Mid-line and left-sided pain and tenderness, with aggravation by food. Soreness, guarding, and increased reflex on the left, especially during pain. Relief by rest, vomiting, diet, alkalis. A normal or low curve of acidity, unless the ulcer is close to the pylorus. A normal or hypotonic type of stomach, with a niche or crater on the lesser curvature and sometimes an opposing spasm. Occult blood in the stools. A poorer tendency to recovery, both with medical and surgical measures, than duodenal ulcer. Tongue usually clean.

Duodenal Ulcer.—High incidence in men, particularly in the period of physical and mental vigour. Family history of duodenal ulcer or hunger in a small proportion of cases. Tendency to heal and recur spontaneously, and especially to recur in autumn and winter. Hunger pain, night pain, and relief by food. Mid-line and right-sided pain and reflex signs. A climbing hypersecretory curve. Occult blood. A high placed, hypertonic; transverse stomach with tenderness over the cap. Good tendency to recovery on rest and ulcer diet and after gastro-jejunostomy. Tongue generally clean.

Carcinoma.—Age incidence. Absence of previous dyspeptic history in most cases. Pain more constant than in ulcer and less definite food relationship though generally aggravated by food. Less readily relieved by rest. Sometimes pain absent throughout and general and anaemic symptoms predominating. Greater frequency of anorexia, nausea, vomiting, furred tongue, and eructations of sulphuretted hydrogen than in other conditions. Low acid curve or complete achlorhydria. Wide gap between free and total acidity. Blood cells and organisms in gastric juice. Persistent occult blood in stools. Filling defects or rigid tubular stomach. Tumours and glands.

Gastritis.—One of the commonest diagnoses, but a comparatively rare cause of dypsepsia. Most cases diagnosed as gastritis turn out to be ulcers or functional dyspepsias. Association with alcohol and gross oral sepsis. Acne rosacea and red nose. Loss of morning appetite; morning nausea and sickness. Diffuse burning type of pain, not so accurately localized as in ulcer. Heartburn, eructations, and tendency to diarrhoea. Low or absent free acid. Excess of mucus and cells. Furred tongue in active phases.

Gall Stones and Cholecystitis.—History of colic or jaundice in a small proportion of cases. High incidence in women. Pregnancy and typhoid predisposing and fatness and increasing weight common. Vomiting, nausea, flatulence, distension. Epigastric pain, right subcostal pain, scapular, interscapular, or shoulder pain. Tendency to diarrhoea or diarrhoea sensations. Shiveriness or slight pyrexia in attacks. Aggravation by exertion, jolting, and menstrual periods. Right subcostal tenderness and catch in breath on deep palpation. Referred tenderness over dorsal spines and eleventh right rib behind. Guarding of right upper rectus and impaired entry at right base in attacks with infected gall bladder. *X* rays seldom helpful. Hyperchlorhydria and achylia both more common than in normal subjects.

Chronic Appendicular Dyspepsia.—Too freely diagnosed. History of possible acute attacks. Epigastric pain without such definite food relationship as in ulcer, but sometimes closely simulating ulcer. Pain in epigastrium on pressure over appendix. Tenderness over appendix shadow when visualized with *X* rays. Positive inflation test. High curves and achylia both more frequent than in normal series.

Post-Gastro-enterostomy Dyspepsia.—This may be the result of gastric discomforts associated with an inefficient or too efficient stoma and consequently with feelings of fullness or empty feelings. It may be due to persistence or recurrence of the original ulcer or to the development of a jejunal ulcer, in which case the maximum tenderness may be found over the stoma, is usually to the left of the mid-line, and commonly at a lower point than obtains in gastric ulcer. In jejunal ulcer there is commonly a persistent high acidity. Fractional test meal shows bile in all specimens after most gastro-enterostomies, but with an unsatisfactory loop bile may be absent in many specimens. Another type of post-gastro-enterostomy dyspepsia is due to too rapid filling of the small bowel. The symptoms are usually discomforts around the umbilicus and below the area of gastric sensibility.

Group C

Symptoms usually vague. Discomfort rather than pain. Fullness and feelings of weight in epigastrium. Flatulence. Aggravation by prominent causal factors and relief by healthier life, holidays, etc. In fatigue dyspepsias loss of appetite common. Physical examination may show too fat or thin a subject, but local examination negative.

Group D

History or family history of tuberculosis, or debility in some cases. Poor appetite, especially in morning, with active disease. In latent disease fullness and discomfort, often aggravated by food, and tending to be worse at the end of the day. A tendency to remain below normal weight or to lose slightly. General tendency to fatigue easily. Prompt improvement in appetite and disappearance of symptoms on rest in bed and feeding up.

Group E

Cases in this group vary from the old man who is concerned about the furring of his tongue to the young woman with hysterical vomiting; from the sufferer from simple aerophagy to the poor victim who blames every cause but the true one for his miseries, and weeds out of his dietary one article of diet after another until he is on starvation rations. The

introspective, the worried, the overworked, and the indolent are numbered in the group. There is greater aggravation by anxiety and worries than by physical factors. Pain as a rule is not localized, and the whole hand is employed in the demonstrative gesture, or there may be several pains. In aerophagy left subscapular pain is not uncommon. Subjects may be "nervy", hypertonic, and restless, or they may be hypotonic and depressed. Phobias of internal disease are frequently present. There is aggravation by directing interest and treatment towards the stomach. Relief by explanation, encouragement, unearthing sources of worry, discouraging hurry and worry (especially in the neighbourhood of meal times), teaching relaxation, bromides, and sensible life and dietary. Surgery spells ruin.

NOTES AND COMMENTS

Medical Field Day

This fall we conducted our second annual field day, and its success indicates that the purpose of such a day which is to give encouragement to the track talent of the Faculty is being realized. The cup for inter-year competition has been won both years by the class of '26. Mr. Jack Naden has twice been successful in winning the gold medal as individual champion. The future looks bright for the development of track talent and next year the medical faculty should be a strong contender for the Inter-faculty track championship.

Medical Athletics

The Inter-faculty championships which have come to the Faculty of Medicine since 1919 are as follows—

1919-20—Rugby and Hockey—Junior Meds.
Basketball—Senior Meds.
Boxing, Fencing and Wrestling—Meds.
1920-21—Harriers—Meds.
1921-22—Rugby—Senior Meds.
Basketball—Senior Meds.

Daffydil Night

The Daffydil Committee wish to announce that the performance this year will be held in Convocation Hall on the 7th and 8th of February. This annual event had its beginning in the old Medical School on Gerrard Street twenty years ago. The first performance took the form of a Punch and Judy show in which the professors were caricatured. At that time the professors were not invited to attend this reproduction of their characters. It is reported that on this occasion the proceedings broke up in a small riot. Daffydil, however, did not become an annual affair until 1912. The same year "Epistaxis" appeared as a single sheet.

Last year's production was the best ever staged and it is the aim this year to surpass it if possible. All undergraduates are urged to support the committee and the staff editing "Epistaxis".

Medical Sick Benefit Fund

Although in operation only one year the Sick Benefit Fund has shown itself to be of great value to the undergraduate. Last year the great majority of the students became members and about forty benefited directly as over $1,000 was paid out for hospital and medical fees. This year there is also a general demand for tickets.

As yet contributions are voluntary but the society soon hopes to put the Fund on a firmer financial basis.

The attention of members applying for payment of bills incurred through illness is called to the following clauses of the Constitution:

1. Each member must have paid his membership fee before November 11th and be in possession of his membership card.

2. This Fund shall have special regard to acute rather than chronic cases and that all cases must arise during the academic year.

3. That any deserving student entitled to his share of the Fund shall present his membership card, doctor's certificate, and hospital certificate before any money be paid to him.

This year distribution will be made at the end of the academic year. Address all communications to R. J. Heffring, Ass't. Sec. Treas., Medical Society Office, Room 107, Anatomy Building.

Medical Society Announcements

The Medical Society hopes to keep in closer touch with the student body through the medium of this JOURNAL than heretofore. In a Faculty such as ours with the upper years scattered somewhere at or between the General, Western, H.S.C. and St. Michael's, it is a difficult matter to reach the undergraduates easily. We believe this can be more readily accomplished through these columns.

The Society regrets that it was impossible to obtain a room where the junior years could meet, but owing to lack of space such a place could not be obtained. They were, however, able to obtain Room 107, Anatomy Building, as an office, and this greatly facilitates the work of the Society and the various committees. This room is open from 5 to 5.30 p.m. every Tuesday and Thursday evening, and anyone wishing to interview the Society may do so at these hours. Copies of the amended constitution have been printed and may be had on application at the Society office.

The opening meeting of Society was held in Hart House Theatre on Tuesday, October 30th. Prof. O. Klotz's address was greatly appreciated. Short speeches were also given by Dean Primrose, Ex-Dean Clarke, Prof. Hendry and Dr. Ryerson. Trophies donated for the Medical Athletic Field Day Sports were presented and following the meeting refreshments were served in the Great Hall and the Women's Union.

A Junior Med Smoker has been arranged for the last week in November and an open meeting for early in December.

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